CISC 7200  [714X] Analysis of Algorithms
37½ hours plus conference and independent work; 3 credits

Introduction to algorithms and their complexity, including models of computation. Review of data structures and techniques of efficient program design. Analysis of algorithms chosen from sorting and searching, graph theory, pattern matching, matrix operations, and combinatorial optimization. Algorithms will be analyzed for their space, time, and other resource requirements. NP-complete problems. Complexity classes.

Textbook

Syllabus

Chapter 1: Analyzing Algorithms
Sections 1.4, 1.5, 1.6
(Read section 1.3 – review of mathematical background)

Chapter 4: Sorting
Mergesort, quicksort, heapsort
Sections 4.1 - 4.9

Chapter 3: Recurrence Equations and Recursion Trees
Iteration Method, Master Theorem
Sections 3.6, 3.7

Chapter 5: Selection
Sections 5.1 - 5.5

Chapter 7: Graphs, Representations (adjacency matrix, adjacency lists)
Graph Traversals (Depth-first, Breadth-First)
Sections 7.1-7.4

Chapter 8: Minimum Spanning Trees
Greedy Algorithms (PRIM, Kruskal)
Shortest Path (Dijskstra)
Section 8.1-8.4

Chapter 11: String Matching
Finite Automata, Knuth-Morris-Pratt algorithm
Edit Distance and Dynamic Programming
Sections 11.1-11.5

Chapter 13: NP-Completeness
Sections 13.1-13.4, 13.8

Bibliography


